Atty. Dkt. No. 038873-0102

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Zouren NIE et al.

Title: ER STRENGTHENING ALUMINUM ALLOY

Appl. No.: 10/747,955

Filing Date: 12/31/2003

Examiner: J. C. Morillo

Art Unit: 1742

DECLARATION OF
ZUOREN NIE
UNDER 37 CFR 1.132

ZUOREN NIE declares and states:

1. I have been employed for the past ten years by Beijing University of Technology, Beijing, China (hereinafter referred to as the "University"), which is the assignee of U.S. Patent Application No. 10/747,955 (hereinafter referred to as "the Application" or "the present Application").

2. I am one of eight co-inventors of the invention which is disclosed and claimed in the present Application, and I participated in the preparation of the present Application as part of my employment with the University.

3. My educational background is as follows. I hold a Bachelor of Science degree in metallurgy, which I earned in 1983 from Wuhan University of Technology, China. I also earned a PhD in materials degree in 1997 from Central South University, China.

4. During my employment with the University, I have been working as a professor in the School of Materials Science and Engineering, including as a group leader for a group of researchers who have been carrying out research of aluminum and aluminum alloys. I have been dean of School of Materials Science and Engineering at the University since November, 2004.

5. Upon information and belief, I understand that the U.S. Patent and Trademark Office has issued a Final Office Action dated July 15, 2005 in connection with the present Application.

6. I further understand, based upon information and belief, that the aforesaid

Office Action rejects Claims 1-5 of the present Application as being unpatentable over U.S. Patent No. 4,713,216 to Higashi et al. (hereinafter "Higashi").

7. I am familiar with the Higashi patent disclosure.

8. My understanding is that Higashi teaches that rare earth elements are conducive to improving the resistance to stress corrosion with additional benefits of improving the hot extrusibility and malleability (Higashi at col. 2, lines 38-40, and col. 2, lines 54-57). Strength means the ability of alloys to resist deformation or rupture, normally measured in force per unit area, and can be very different from the properties of stress corrosion. Higashi suggests that addition of rare earth elements would not increase, or may even lower, the strength of Al-Zn-Mg alloys as shown by comparing the strength of the rare earth containing alloys 1-10 and that of the comparative alloys 16-17 in TABLE (3) of Higashi.

9. I am familiar with research directed to increasing the strength of Al-Zn-Mg alloys before the present invention, in which different elements, including rare earth elements, have been found to have varying effects on strengthening Al-Zn-Mg alloys. For example, Yi-Lei Wu et al.,[1] studied the influences of Sc, Ni and Ce on Al-Zn-Mg-Cu alloys and came to the conclusion that Sc provides the highest increase in the strength of the alloy, while Ce has little strengthening effect (See Wu et al., p. 1024). It can be estimated from Table II of Wu et al. that the addition of Sc can increase the strength of the alloy by about 6%. The Al-Zn-Mg-Cu alloy of Wu et al., contains Cu as a minor alloying element. The commercial 7xxx series aluminum alloys, such as some of those disclosed in Wu et al., normally contain a minor content of Cu[2]. In all of the prior art literature that I am aware of, Sc is the only practical rare earth element revealed to have a suitable strengthening effect on Al-Zn-Mg alloys.

10. My co-inventors and I unexpectedly discovered that Er could dramatically increase the strength of Al-Zn-Mg alloy, even to an extent of strengthening by more than 20% with the toughness substantially unchanged compared to an alloy without Er (See table 3 of the present Application). Such a large increase in strength (by more than 20%) would not have been expected by a person of ordinary skill in the art at the time of the present invention.

11. During research for the present invention, my colleagues and I also investigated the effects of the rare earth elements Nd and Gd on the strength of Al-Zn-Mg alloy, and found such elements lowered the strength as well as the toughness of the Al-Zn-Mg alloy. Since such rare earth elements had no positive effects on the strength of Al-Zn-Mg alloy, I did not keep the relevant test data. It is my opinion, however, that a person of ordinary skill in the art would have come to a conclusion, based on the facts discussed above regarding the state of the prior art prior to our invention, that different rare earth elements have different effects on the strength of Al-Zn-Mg alloy, and that few rare earth elements would be recognized as strengthening Al-Zn-Mg alloy.

12. It is my opinion that at the time of the present invention, a person of ordinary skill in the art would have recognized that Higashi merely teaches that rare earth elements are conducive to improving the resistance to stress corrosion with the additional benefit of improving hot extrusibility and malleability, but that Higashi does not disclose the effect of rare earth elements on increasing the strength of Al-Zn-Mg alloy. It is my opinion that a person of ordinary skill in the art would have understood the Higashi disclosure as suggesting that in fact the addition of certain rare earth elements lowers the strength of Al-Zn-Mg alloy based on the comparison of the tensile strength of Al-Zn-Mg alloys containing rare earth elements with that of Al-Zn-Mg alloys containing no rare earth elements in TABLE (3) of the Higashi disclosure.

13. It is my opinion that a person of ordinary skill in the art at the time of the present invention, based on the disclosure of Higashi, would not have recognized that Er could increase the strength of Al-Zn-Mg alloy, especially to such a great extent of over 20%.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Respectfully submitted,

Date: Jan. 12, 2006

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[1] Yi-Lei Wu et al., "Microalloying of Sc, Ni, and Ce in an Advanced Al-Zn-Mg-Cu Alloy", Metallurgical and Materials Transactions A, Vol. 30A, April, 1999, pp. 1017-1024.

[2] International Alloy Designations and Chemical Composition Limits for Wrought Aluminum and Wrought Aluminum Alloys, The Aluminum Association, Inc., October 2002, pp.8-9